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Author: Mr. Samer Elhoushy
BLUECUBE Aerospace, United States

Mr. Kevin Simmons
BLUECUBE Aerospace, United States

CAPSAT-1: THE LESSONS LEARNED IN DEVELOPING A SATELLITE MISSION WITH MIDDLE AND HIGH SCHOOL STUDENTS

Abstract

In November of 2018, the CapSat-1 CubeSat mission was submitted to NASA's CubeSat Launch Initiative (CSLI) program. In March of 2019, the CSLI announced 16 missions selected for that program, one of which being the CapSat-1, which was submitted through the Wolverine CubeSat Development Team (WCDT): the only middle school program nationwide to have developed and launched a CubeSat. The CapSat-1 was submitted along with 4 other CubeSat proposals, and each proposal that was submitted utilized the experience each student gained prior when developing the WeissSat-1 mission. Students from The Weiss School have presented at NASA headquarters, multiple International Astronautical Congresses (IAC), the International SmallSat Conference, and local, statewide, and national conferences. This presentation covers the perspective of a young student, the Co-Investigator of the CapSat-1 mission, developing the CubeSat, the necessary ambition for today's youth to elevate STEM and aerospace workforces of the future, and the lessons learned regarding the development of teamwork and time management skills at such a young age.

The CapSat-1 is a technology demonstration mission to eventually validate a capacitor-based electrical power system in a 1U CubeSat. A capacitor, a much smaller battery compared to the regularly used Lithium Ion Polymer (LiPo) battery in CubeSats today, has been proven to be both safer and more durable than LiPo batteries. This mission would validate their power/voltage efficiency and compare that to the LiPo battery over time throughout a mission of approximately 6 months. Though its secondary mission is for technology demonstration, the CapSat-1's primary mission is education. The CapSat-1 mission is in the process of developing into a fully manifested satellite in low-Earth orbit (LEO), and providing students with the necessary opportunities to develop a satellite mission and to gain hands-on learning experiences in the STEM workforce.